

THE BLUE BOMB

By J. V. Gisey

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SYNOPSIS

Ned Gafford, who has been unjustly accused of treason when at West Point, and gone to Japan, has become an opium slave. While in an opium dream, he overhears a conversation between two Japanese who want a war against the U. S. for the sake of selling their "Blue Bombs," which are an invention of Karloff, a Russian nihilist.

Later Gafford saves Shiela McRae, daughter of the American Secretary of State, from abduction by Oshitu, the Japanese of whose crime Gafford was accused.

She urges him to regain his manhood for the sake of his country, so with the help of "White Kate" he overcomes his drug habit.

While he is kept imprisoned, Shiela is abducted by Oshitu. "White Kate" hears of it, and sends Gafford to her rescue.

Gafford, disguised as a coolie, starts in pursuit, having learned where the blue bombs are made and judging that to be his destination.

He gains the confidence of Karloff, who turns against Oshitu when he learns that the bombs were to be used against the U. S. instead of Russia, and agrees to help rescue Shiela.

It seemed to Gafford that he had never known what self-control meant until he had looked into the cool, blue eyes of Shiela McRae that night and sworn to her to be a man.

Something about her had stirred him in unknown depths of his being, and the thing she had waked refused to die. Those first four days when he had been shut in to fight with the demon of habit had been only the first step, as he had known it must.

Fortune had favored his endeavor since then in that events had crowded one another's heels. Save for the voyage from Nagasaki to Kobe, he had been constantly in motion, fighting himself to a weariness which compelled sleep. But the voyage had shown him how weak he still remained. His habit was merely a scotched snake. It was not dead.

He had lain in his berth wide-eyed and fought his battle, or paced the floor of his room with clenched hands and a sweat-soaked body which trembled with desire and assaulted the citadel of his will.

Insidiously it crept at times upon him. Just when he felt the strongest, and had for the time forgotten the thing he combated, it would rear its head and reduce him to a pitiful thing which begged the surrender of his mind. Today he knew, as he lay and watched the house which held her in bondage, that the face of Shiela, which had never left him, had been the strongest element in helping him to deny the inner voices of desire.

"It is fate," whispered Gafford to himself. "They say there is no such thing, and they lie. Fate sent me here to be ready, Shiela—to be ready to save not only my country but you. And when the time was ripe fate sent you to wake me up and set me to work. I've an idea 'way back in my head that fate will bring us still closer together after this is over, and I've a firm mind to help fate all I can." He grinned like a boy.

Suddenly his heart gripped. Down in the space between the prison compound and the plant, where the sun through the smoke cast its red glare even at noon, he saw two figures moving. One in uniform and one in brown khaki; one short and quick of motion, the other tall, massive, moving with a long stride. They came from the plant of the bombs and approached the steps of the building where hung the flag, turned and mounted, and were lost to view. Gafford knew them for Oshitu and Karloff, and he knew that now the drama of cross purposes between them had begun. Karloff would deliver his spurious message and seek to fathom the meaning of Oshitu's dark face.

What would he learn, or would the impassive little engineer be able to disguise his emotions? It came over Gafford, as he lay, that even now fate was deciding for him and Shiela. He found himself trembling as he held the glasses before his eyes.

"What," he questioned, "would fate decide? Would Karloff learn and be convinced? He had said that he believed in Gafford's integrity; yet he had added that the supreme test which was to determine his actions would be his learning that a white woman was really detained in Oshitu's house." That she was there Gafford could not doubt. The mere fact that Oshitu had brought back a woman with him proved it. The disguise of the geisha did not deceive him for an instant, or even raise a doubt. The engineer would naturally adopt some such for taking her with him. What more natural than that of one of the national class of women whose life was that of toys?

He gritted his teeth and shivered. What had the girl endured during those days now past? How far had she withstood the purposes of Oshitu? That the man was a beast he knew.

What had been the woman's fate? For days the thought had lurked in the back of his brain, but today, for the first time, he let it out. Was she the same girl of the garden of the Nippon, or had her fate been cruel to her? A flush of shame warmed Gafford's cheeks, because he knew that, no matter what might have happened, she was still the same in her soul, and would always be.

Presently Karloff came down the steps of Oshitu's house and hurried away toward the factory buildings. Though he watched for an hour, Gafford saw no sign of the Japanese engineer.

The sun sank slowly downward toward the west. At an hour which Gafford judged to be somewhere around four the bugles blew once more. Again the prison compound opened its gate, spewed forth a trudging line of men, and received another into itself.

It was evident to Gafford that they were working three shifts, and pushing the production to the uttermost. He turned his glasses away from the plant itself and began a search for the hut where Karloff had told him the track motor was kept. After a time he found it and studied its position against the time when he should steal down to meet the Russian after dark.

As the hour grew later he began to experience the strain of uncertainty and waiting. As long as it was fully day he had been content in a way to lie on the ledge and watch. Now, with a failing light, came impatience of delay, unanswered questions, and doubt.

What had Karloff learned? Was Shiela really there? Was she safe? Was she even alive, or had she chosen to die, perhaps? Would the Russian really meet him? Had he been convinced, or had he but pretended in order to learn of his attempted mission? Had he really talked to Oshitu of a pretended message, or told him of a man he had met in the hills? It seemed to Gafford that the twilight brought those doubts upon him as he waited and watched.

Lights began to twinkle in the valley under the pall of smoke. A faint glow rose from the tall stacks and the open mouths of the cupolas, where the molten metals waited to make the castings of the bombs. A faint wind came up and rustled the grasses and weeds on the edge of the ledge where he sat.

Presently inaction grew irksome beyond endurance. With a last glance to the west, where the sinking sun still made a lemon-yellow streak in the heavens, he rose and moved away.

He made his way back toward the hut of the wireless, and with it as a landmark went on to the road which led down the mountain to the plant. When he had gone far enough along this as his recollection of his observations from the ledge warned him, he turned off and struck through the dusky timber toward the right-of-way of the railroad.

Above him it was still twilight, but here under the trees it was almost night. He began to hurry as he went forward, so far as he consistently could with caution. After a time he saw a faint lightening of the gloom before him and came out beside the track. He mounted it and turned again toward the valley at a smart trot.

As he went on the night came completely down, and the glare of the furnaces shone above him on the cloud of smoke. Their glow reflected until his way became faintly lighted by a strange red light. As on the night before, it waxed and waned as the fires in the forges leaped and died.

It reminded him of the midnight fires he had witnessed as a boy when he had crept from his bed to look at the reflection of flames or had gone racing after the fire-engines as they dashed by. He became aware of a dull reverberation which beat about him, and knew it was the roar of the great plant in the night.

It was though it had become a senseless thing and roared out the malice of the things born within its fiery heart. To Gafford, in his mood, it seemed that it might be the modern metamorphosis of the fabled dragon—a creature with a heart of fire, breathing a fiery breath which blighted all it touched.

He moved through the red reflection of its breathing, a lone knight seeking to destroy its might. He smiled as he trotted forward and recognized the thought.

Not only was he a knight prepared to do battle, but his mission was one of rescue for a captive maiden as well. "I must slay the dragon and save the damsel this night," said Gafford, and ran on.

By and by he came to the point where the switch turned off toward the magazine of the bombs, and to the little hut of the track-workers. It was merely a shed set to the side of the track, and closed at one end by a door. Two rails ran under the closed leaf of the opening, which he saw at a glance were for the accommodation of the motor Karloff had mentioned. Suddenly it occurred to him that the car might be useful in escaping after they had freed Shiela McRae.

He crept forward from where he had leaned in the shadow of the shed and began an examination of the fastenings of the door. He found them to be nothing more than a hasp and padlock of not particularly strong design. Without more consideration he began working to break into the shed, and came at the car. Here the knife he had brought from White Kate's came into play.

The door was of soft pine, and the knife was strong. Gafford began to cut away at the section which held the hasp to the door. The waxing and waning glare showed him the progress he was making. He cut and gouged until a deep groove grew in the board about the staple of the hasp. When it was as deep as he judged sufficient, he covered the hasp with a corner of his blanket and struck it sharply with the butt of Yamata's revolver. It yielded, detaching the piece he had cut out and

freeing the strip of metal which formed the bar of the hasp.

He chuckled as he seized the door and slid it back.

He stepped inside and rolled the door shut behind him, groped for the car, and sat down. Alone in the darkness, he sat and waited for what seemed a long time.

A step sounded from outside. Gafford stiffened and listened. It came again.

He became convinced that some one was approaching along the track. The steps came on and paused outside the hut. He crept to the hole he had made and peered through. Directly beyond him stood the massive figure of a man. He was standing in front of the hut, his eyes searching the shadows beyond him. As Gafford watched, he leaned forward and spoke:

"Gafford?" he questioned softly.

"Gafford?"

Gafford's heart leaped. It was Karloff who called him. He had come to the meeting, and that alone proved that he had learned what had convinced him of all.

Shiela, then, was in the house of Oshitu, and the Russian was come to redeem his pledge. With a bounding heart he seized hold of the door and rolled it back.

"All right, Karloff," he said quickly, "I am in here!"

CHAPTER XI.

Explosion and a Battle.

Karloff started and turned toward the door. "What are you doing in there?" he asked quickly. "How did you get in?"

"Broke in," said Gafford. "I thought maybe we might be able to use this little motor in getting away with the girl."

"So," muttered Karloff. "I see. Never mind that now. My motor is waiting down on the road. I've just killed my chauffeur!"

"Killed him?" gasped Gafford. "My God, man—what for?"

"In order that you might wear his clothes," said Karloff coldly, turning away. "Come!"

Gafford followed him across the track and into the grass and small bushes which grew beside it. A shiver gripped him at the matter-of-fact manner in which the Russian announced his murder of the Jap. Karloff, leading the way, seemed to sense his companion's attitude, and began to speak:

"There is no need to worry about the chauffeur's demise, my friend. I had no compunction in killing him. We of the society, hold that a personal sin becomes justified when a great good to the many may be wrought thereby. If we are to get this girl and save your country and the race of the whites, we must not let the obstacle of one life stand in the way. In the plan I have formed it is necessary for you to be clothed as my chauffeur. To obtain his uniform while he was living would have been impracticable, therefore he died. These yellow men would have no compunction in killing us a few days from now. One may not scruple too closely in war."

Gafford caught at his mention of Shiela.

"Then you found that I was right about the girl?" he asked.

"Yes and no," said Karloff. "She is there, as you felt certain, but this Oshitu, like many men of his class, is a surprise. He told me frankly that he has her, but he also tells me that he has offered her marriage—that he loves her, and would make her his wife."

"Loves her?" stammered Gafford. "The insufferable brute!"

"You should be glad it is so," Karloff responded. "It has meant much to her."

Out of complete emotion Gafford said no word. In his heart he breathed a prayer of thanks for what had revolved him a moment before.

They reached the road and the motor where the dead man still sat in the seat. Without a word the Russian dragged the body from behind the wheel and threw it upon the rumble at the back. Having disposed of it, he climbed in and sat down in its place.

Gafford ran around and took place at the other side. The machine leaped into action and fled away toward the hills. For a moment he sat in surprised lack of understanding at his new turn in affairs, then:

"Where are we going?" he inquired.

"To the wireless hut," replied Karloff, increasing the speed.

Gafford clung to the seat as the auto swung and swayed.

"But why?" he questioned as it righted itself.

"Because my plan of action leads there," snapped Karloff. "Watch the body and see that it doesn't bounce off. This road is bad."

It seemed to Gafford, in that moment, that a madman sat at the wheel. Karloff drove with the recklessness of one utterly devoid of care.

Without doubt he had formed some definite plan of procedure, but to Gafford it was incomprehensible. Still, he bethought him, the man ought to know the situation better than he. He said no more, but turned in his seat and laid a steady hand on the body of the dead chauffeur, while they rushed ahead.

They reached the foot of the hills and began to climb. The throb of the motor was the only sound as they mounted the grade. Karloff threw the throttle wide open and took the grades with a rush.

The lights splashed long strips of brilliance ahead, and presently showed the hut. The Russian cut off his power and slid to a stop at its door.

"Drag the body inside and get into its clothes!" he directed as he climbed down. He leaned back into the car and carefully lifted out a padlocked box.

While Karloff unlocked the door of the wireless hut, Gafford shouldered the body of the chauffeur. Together they went inside. Karloff set down his box and switched on some lights plainly fed by the plant in the valley. Gafford laid the dead man on the floor, and began removing the clothing he wore.

Karloff opened his box, lifted out

a complicated bit of mechanism, consisting of sextants, wires and dials, carried it to the wireless table, and took up a pair of wires, which hung down from one end. These he began to connect with the machine he had brought.

He worked with utter absorption. Gafford dressing himself in the still warm uniform of the chauffeur, sensed that his presence was forgotten by the man who bent above the table, adjusting the creatures of his imagination with a touch as gentle as a mother's.

There was love in every motion of his hands, yet the throat of the man on the floor showed how terrific their power could be. Those same fingers had throttled his life, as a candle is pinched out.

When he was dressed the American approached the table and halted at the Russian's side. Karloff glanced up.

"So," he began, "you will do very well. See now? I shall explain all this to you, and you will understand. I told you that the Japs thought themselves wiser than they were. They thought they knew all, but they held something back—something they knew not of. This," he touched the machine he had brought in the car—"is it. Without it my little blue pigeons lose their sting. The firing devices are not as the Japs think—all!"

His voice quivered as he spoke. The hand which he had laid upon the machine trembled. The eyes which he turned upon Gafford sparkled and shone with an almost fanatical light.

"And it shall be used once—just once," he said slowly, "and then no more. And that once is tonight. But I will explain: This machine is the thing which really fires the blue bombs. The firing devices are, after all, no more than the cap of a cartridge, which, unless it is struck, will not explode. Unless they are struck by the spark of the wireless, they will not fire the bombs. The fools, not to see it! How could I both fly my pets and explode them by the same power, unless there was some control?"

"You mean that this machine in some way regulates, or chances the spark so that it explodes the bombs?" gasped Gafford in amazement.

"Precisely. It changes the potential of the spark. How else could the thing be done? These sextants and dials show with mathematical precision the range to which the spark may be concentrated with sufficient power to explode the charge in the firing device."

"If a bomb is a kilometer away one moves the index to the word 'kilo,' and switches the spark through a shunt circuit into the machine. In one second after the bomb will explode. The dial here automatically registers the position or distance of the bomb when it is flying through the variation of the potential of the current used. That, by the way, is how they are flown and controlled, by projecting a repulsive force against them. If, by chance, they are sent too far away, a weakening of the current effects an automatic reversing lever in the bomb and brings them back."

"Here"—he rose and bent over the table—"is a plan of the valley." He pointed to a plan spread beyond the switches on the table and marked to show the different positions of the works, the compound, the magazine, and the line of the surrounding hills.

"I have prepared this against the tests which were to be tomorrow. You see the distances are plainly marked. The magazine is three kilometers from this hut. The prison compound five, and so on. The bombs are set in motion by the short wireless receivers on the back of each. Through them the motors of the propellers are started. As long as they are within the radius of control they will run, and when it grows too weak they automatically reverse and fly back. There is also a way to steer them right or left, up or down, or in a circle, by means of certain variations of the current which it would take too long to explain."

"It is wonderful! Wonderful beyond any dream of mortal mind before," said Gafford in a voice of awe. "I wish I could see you do it—just once!"

"Patience," whispered Karloff, with flashing eyes and hands which hovered over his brain-child and trembled. "You shall, my friend. You shall!"

"What do you mean?" Gafford spoke hoarsely. Karloff's attitude, the intonation of his voice, his whole action since the meeting at the hut by the switch had affected him strangely.

The Russian drew himself up, folded his arms, and threw back his head. So for a moment he stood and looked into Gafford's eyes. "I shall tell you," he said loudly. "I and my bombs shall, tonight, save a world from a war of destruction. First shall we save this girl of the people, we and my little blue pigeons. Then"—he lifted his arms and shook them in a frenzy of emotion—"I shall slay them all; slay them—my children! One by one they shall die by the hands which made them. They shall die a sacrifice—that shall redeem the lives of many. And the many shall never know that I, Karloff, have given them life!"

He dropped to a stool in front of the table and bowed his head on his arms.

Gafford sprang to his side and seized his shoulders.

"Karloff," he protested—"Karloff! in God's name, what do you mean?"

The great shoulders he gripped heaved beneath his hands. Something like a sob burst from the bearded lips. The Russian lifted his head.

"It is past," he said softly. "The dream of a lifetime is dead!" Quite calmly he drew out his watch and looked at its dial. "There is time to tell you," he decided. "We shall not act until midnight, my bombs and I. Tonight I announced that I would come to the hut and spend the night, against tomorrow. I took Nishi and set out. I had to bring him, or it had looked peculiar—a change in my habit. When we neared the hut at the switch I made him stop."

"Then I took his neck in my hands and choked him, came and found you and we came here. At midnight they change shifts in the works again. At a few minutes before then I shall fly a bomb from the field where they are now awaiting tomorrow's demonstration. Just at midnight I shall explode it over the prison. It will practically destroy the place. The explosion will throw the entire works into demoralization. They will get a taste of what they meant to give others, and their death will come without warning out of a clear sky. With such a chance, what convicts are in the shops and such as are not killed by the bomb will seize the opportunity to rise and escape. It will be their first impulse. The guards will be unable to hold them, for they, too, will, for the time, be demoralized. At once we will go down in the motor. You in the uniform of Nishi will pass unobserved in the confusion. I am too well known to excite attention. Oshitu will, perforce, be out of his house, directing his men. We will slip in and slip out with the girl. This is the thing I have planned, and this will we do. I, Dimitri Karloff, shall undo what I have done, because, after all, my blood is white!"

"My God!" said Gafford, as the full scope of the plan gripped him. "You'll get the girl, come back here, and blow up the whole plant?"

Karloff nodded. "But for the girl, as I told you this morning, I could do it now." Again he looked at his watch. "It was now a quarter of twelve. We shall begin!"

He crossed to the side of the hut and threw the little turbine water-wheel into gear. It purred softly. Karloff touched another lever and a rising whine came from the dynamo. He came back to the table, moved a switch slightly, and waited. The crackling crash of the wireless spark flashed and echoed through the room. Karloff waved Gafford to his side.

"Now watch!" he cried in a voice shaking with excitement. "Down in the field below are packed the bombs. This chart marked one, two, three, four, shows their positions. I place the needle of my indicator on this sextant on the table at 'four.' That is the bomb nearest the plant. Now, watch the dial of the range-finder. I have just explained to you. Watch it! It is steady at present. Watch its needle!" He pressed another switch. The crackle of the spark changed, tuned, and settled to a steady snapping hum.

Suddenly, as Gafford watched the tiny dial before him, the needle began to move. It swung slightly, checked, and started to crawl across the dial to the right.

Karloff laughed aloud. "She is flying!" he cried out hoarsely. "She rises and moves to the right—my little blue pigeon. Fly away! Fly away, my pet! Ah! One kilo, two, three! Is she not swift, my friend, Gafford? Four! And a half! Now, stop, my beauty! Stop! Stop! Swiftly he turned a circular button. Again the pulse of the wireless changed its tone. The indicator slowed before Gafford's eyes and stopped.

"Five!" screamed Karloff. He glanced at a second row of figures on the dial.

"Two to the right. See? It is shown on this dial also, before me in the table! They correspond. This other dial gives the elevation—three hundred feet. So. Now my pigeon hovers over the prison, and it is five minutes of twelve. The thing is done. Watch now, friend Gafford, and you shall see what no man has ever seen before. At twelve I shall lower it .50 fifty feet and fire. Do you go out and start the motor in my car and come back at once."

Gafford ran from the hut. With hands which trembled he groped for the self-starter and touched the button. The engine caught with a roar. Even as it toned to a steady throb, the faint, sweet notes of a bugle came to his ears.

He ran back to the hut. Karloff stood beside his table, leaning forward. His fingers touched a button and turned it slowly, while his eyes read an indicator's scale. He paused and glanced at Gafford with eyes which seemed to shoot fire.

His face was drawn and distorted with back-drawn lips which showed his gleaming teeth.

"Now watch!" he rasped as he turned back to his work. His hand seized a tiny lever on the range-finder and drew it toward him. "In one second now—one second—only a little second—Watch!" He snapped the lever clear over and leaped back.

Out over the dusky valley, under the pulsing glare, grew a great light. It was white, blinding, appalling. To Gafford it seemed that it scared the sight from his eyes for the brief instant of its existence, and faded to leave him groping in an utter darkness out of which grew the faint illumination of the wireless room, with Karloff standing straight, tall, massive, as if turned to stone, an expression of exaltation on his face.

A terrific concussion followed. The ground trembled beneath their feet. The hut seemed to rise and sway under the impact of the terrible shock. Karloff seemed to shrink together and gather his wits.

"Quick! To the motor!" he cried out and ran from the room.

He was in his seat backing the car to turn as Gafford sprang into the other seat. The roadster swung round and leaped forward under his control. In a mad rush it swerved into the road down the mountain and tore forward, swinging, swaying, bouncing like a runaway thing.

Gafford will never forget that rush down the dark side of the mountain. He clung blindly to his seat and held his breath as the wind of their passage tore by.

If he had thought Karloff a madman before, he was sure of it now. He drove with a wide-open throttle, which hurled them down grades and around curves in a way which promised certain destruction from second to second. Their course was the flashing whirl of the flight of a comet whose trail was a hissing cloud of dust.

Upon their ears as they fled down the swirling track burst the sounds of distant firing, the crack of rifles, the singing of bugles, and a dull, vullen roar like that of the factory's

furnaces and forges—the roar of fighting, struggling men.

"Hail!" shrieked Karloff. "They're at it—they're at it—tearing one another's throats!"

Gafford heard that shout above the conflict and the motor's roar.

With a slide and a wrench they slid to a final standstill close under the walls of the nearest building. The sounds of the struggle came loudly now from the other side of the plant. Karloff made no comment as he sprang out and started running toward the noise of battle. Gafford followed at his heels.

They broke from cover around the building and ran along an alley between two others. Shots, yells, and the sullen roar from savage throats grew in volume as they pressed on. They darted around the corner of yet another structure and came out in sight of the space between the compound and the plant. A body of men running at a quick step swept upon them. Karloff stopped and waited while they passed.

Their uniforms showed them to be of the prison guards. A few steps beyond they stopped, knelt down, and began to fire at the swirling mob which showed plainly under a searchlight turned upon them from the electric plant of the works. Without hesitation Karloff ran up to the officer in charge of the squad.

"Where is Oshitu?" he cried above the noise of the night.

The Japanese waved a hand toward the partly ruined compound.

"Over there directing the matter," he answered and turned back to his men.

"Come!" Karloff commanded and again set off at a run, darted along the side of the building next the house of Oshitu, around its end, and so came upon the pagoda house from the rear. His hand fell upon the door and shook it. It was locked.

"Let be!" he rasped as Gafford would have tried it, drew back, and hurled his shoulder against it with all his might.

They stumbled into a dimly lighted hallway which ran straight through the house.

"Do you know which room?" questioned Gafford and paused as the lights went out.

Karloff swore. "They've wrecked the machines," he growled. "The stokers are convicts, and they've broken loose."

As if to confirm his words, the searchlight on the powerplant died and the yells of the convicts redoubled and took on a more savage note.

To Be Continued.

Famous Sayings of Naval Heroes

John Paul Jones, naval hero of the Revolutionary War, hoisted for his flag thirteen white and red stripes and inscribed under a serpent ready to strike the motto, "Don't tread on me!" But his most memorable bit of phrasing was his reply to the captain of the Seraphis who, at the end of an hour's conflict, asked him to surrender.

"I have not yet begun to fight!" retorted Jones. And events justified his assertion, for the Bonhomme Richard (named in compliment to Benjamin Franklin) took the larger vessel. Later, when Jones was told that George III. had knighted the captain of the Seraphis for his gallant conduct in the battle, Jones said:

"Never mind; if I meet him again I'll make an earl of him!"

Foaming in Aerated Waters.

One of the substances employed to give a foam to aerated waters, and we have little doubt to beer as well, is saponin, very small quantities of which, when added to water, impart to it a frothy character. Now saponin is a glucoside, and glucosides are in the main, poisonous substances.—The Lancet.

TELEPHONING FROM A TRAIN

An Invention of Much Importance in Railroad Systems.

Exhaustive practical experiments have recently been conducted by a Kentucky railroad with a telephone device, the complete success of which is of much importance. By means of this system, says Harper's Weekly, a moving train may communicate with any city having telephone connections, and in the trials, under adverse weather conditions for the most part, conversation was held with parties in New York, while the Kentucky train was moving at a speed of from 15 to 35 miles per hour.

By means of the new system train dispatchers can at any time give orders to a train crew, thus absolutely eliminating all danger of collision, and passengers may call up anyone with whom they wish to speak, just as over an ordinary long-distance wire. Trains traveling in the same or in opposite directions may also communicate with each other. By many prominent railroad officials the device is said to be second in importance as a safety appliance only to the air brake.

In the trials the telephone was placed in the cabin of the engine and connection with local exchanges was obtained by means of two heavy copper wires stretched alongside the track at a distance of five feet. Contact between the train and the wires was maintained by a form of trolley connected with the locomotive boiler. This trolley is made of gas-pipe and carries two small tanks filled with a chemical mixture, through which steam is fed to make a chemical induction at a distance which may vary from half an inch to three feet, thus allowing for all vibrations and sway of the moving train.

The expense of establishing such a telephone line would not, in many instances, be at all great, as the wires could be strung on the telephone poles along the right of way.